

REMARKS

The foregoing amendments and these remarks are in response to the Final Office Action ("Office Action") dated September 10, 2003. A request for a one month extension of time is provided in conjunction with this amendment. Pursuant to 37 CFR §1.17(a)(1) a check in the amount of \$110.00 is enclosed for the extension of time. Please charge any deficiencies, or credit any overpayments to Deposit Account No. 50-2884.

At the time of the Office Action, claims 1-23 were pending in this application. Claims 1-2, 4-5, 8-9 and 12 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,452,549 to Lo ("Lo"). Claims 6-7 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Lo in view of U.S. Patent No. 6,483,481 to Sievenpiper et al. ("Sievenpiper"). Claims 10-11 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Lo in view of U.S. patent No. 6,512,487 to Taylor et al. ("Taylor").

I. Objections to Drawings

Figs. 1, 3, 4, 5 and 6 were objected to for informalities. Formal replacement drawings are included with this amendment. No new matter has been added to the drawings. Withdrawal of the drawing objections is respectfully requested.

II. Claim Rejections on the Art

Prior to addressing the Examiner's rejections on the art, a brief review of applicants' invention is appropriate. Briefly, the invention concerns an array of radiating elements which include a first and second plurality of antenna elements in an array configuration. The first plurality of radiating elements are dimensioned for operation on a first band of frequencies. The second plurality of antenna elements are also in an array configuration, but are dimensioned for operation on a second band of frequencies.

Further, the first plurality of antenna elements is advantageously positioned in a plane spaced apart from the second plurality of antenna elements so as to act as an effective ground plane for the second plurality of antenna elements.

As recited in amended claim 1, the first and second frequency bands are adjacent to one another so as to allow the array to function essentially as a single wideband array covering both bands. The lower frequency range of the high frequency elements can begin approximately where the response of the low frequency antenna elements cuts off. This provides the antenna array system with a wider continuous bandwidth than an array formed from a single type of antenna element.

Claims 1-2, 4-5, 8-9 and 12 were rejected under 35 U.S.C. § 102(e) as being anticipated by Lo. Lo teaches stacked arrays of radiating elements in which a first array of high frequency elements can act as a ground plane for a second array of low frequency elements. According to Lo, the two bands can have a frequency ratio of as little as 4:1. This is significant because the frequency bands in Lo are still well separated.

By comparison, in applicants' invention as recited in amended claim 1, the first and second arrays have operating frequency bands that are actually adjacent to one another. This means that the frequency ratio as between the two bands in applicants' invention can be considerably smaller than the 4:1 limit set forth in Lo. The adjacent positioning of the frequency bands in applicants' invention allows applicants' array to provide practically continuous frequency coverage over an exceptionally wide frequency

range in a single compact package. The effect is enhanced where interdigitated radiating elements are used.

In response to Applicant's previous amendment to claim 1, the Examiner has noted that the recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art to patentably distinguish the claimed invention from the prior art. Currently amended claim 1 recites a first plurality of antenna elements *having a first set of element dimensions for operation on a first band of frequencies and having a second set of element dimensions selected for operation on a second band of frequencies*. The second band of frequencies is substantially adjacent to the first band of frequencies to facilitate wideband operation.

Since the antenna elements are dimensioned for efficient operation on specific bands of frequencies, the antenna elements are structurally limited. Specifically, the frequency band on which the elements will be used governs the dimensions of the elements. For instance, a plurality of antenna elements dimensioned for operation on a first band of frequencies will not operate as efficiently on other frequency bands.

Since the antenna elements recited in amended claim 1 are structurally limited to operation on substantially adjacent frequency bands, amended claim 1 is distinguished from Lo in that Lo fails to disclose such a limitation. Moreover, Lo specifically states that the antenna system disclosed therein is operable in at least two frequency bands having frequency ratios as little as 4:1. Thus, amended claim 1 is believed to be in condition for allowance.

Claims 6-7 were rejected under 35 U.S.C. § 103(a) as being unpatentable over

Lo in view of Sievenpiper. Claim 6 recites first and second sets of feed organizers for communicating RF signals to first and second pluralities of antenna elements.

Importantly, Neither Sievenpiper nor Lo disclose feed organizers for communicating RF signals to pluralities of antenna elements. Moreover, Sievenpiper does not even disclose antenna elements. Instead, Sievenpiper merely provides a high impedance surface that has a plurality of conductive metal plates with associated connections to a ground plane.

The connections to ground that Sievenpiper discloses are in the form of conductive vias, which are distinct from feed organizers. Conductive vias are bores drilled through a substrate which can have a conductive material deposited therein. Thus, Sievenpiper requires that a solid dielectric completely extend between structures being connected by the conductive vias. In contrast, feed organizers can be rigid structures themselves, independent of the substrate. Using feed organizers, it is not required that a solid dielectric completely extend between structural layers. For example, as disclosed in the specification of the claimed invention, the volume defined between upper and lower antenna surfaces can be filled with gas or liquid. Such an embodiment is possible with feed organizers, but not conductive vias.

Claim 6 also recites pluralities of the first and second feed organizers being arranged in a common grid pattern. A plurality of RF feeds of the second feed organizers form a second feed organizer grid pattern interposed on the common grid pattern. Again, neither Lo nor Sievenpiper disclose this limitation. Notwithstanding that neither Lo nor Seivenpiper disclose feed organizers, as noted, neither reference

discloses a second antenna feed grid pattern interposed on a common grid pattern.

Such an arrangement is extremely beneficial from a perspective of manufacturability when feed organizers are being used in the manufacture of an antenna having multiple layers of antenna arrays. In particular, having the second antenna feed grid pattern interposed on the first antenna feed grid pattern facilitates automation of the process of installing feed organizers into the antenna structure.

Claim 7 recites that the feed organizers extend through a plane approximately defined by the first plurality of antenna elements. As noted, neither Lo nor Sievenpiper disclose feed organizers, and thus wholly fail to teach or suggest the limitation recited in claim 7.

Claims 10-11 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Lo in view of Taylor. Taylor, however, is subject to statutory exclusion under 35 U.S.C. § 103(c) and thus is disqualified as prior art. Specifically, Taylor would only qualify as prior art under 35 U.S.C. § 102(e); Taylor is assigned to the same entity as the claimed invention, namely Harris Corporation (and was so at the time the claimed invention was made); and the claimed invention was filed after November 29, 1999. Accordingly, the rejections of claims 10-11 are improper. *The Manual of Patent Examining Procedure (MPEP)* § 706.02(k)(E).

III. Allowed Claims

In the office action claims 13-23 were allowed.

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IV. Conclusion

Applicant has made every effort to present claims which distinguish over the prior art, and it is believed that all claims are in condition for allowance. Nevertheless, Applicant invites the Examiner to call the undersigned if it is believed that a telephonic interview would expedite the prosecution of the application to an allowance. In view of the foregoing remarks, Applicant respectfully requests reconsideration and prompt allowance of the pending claims.

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Date

Respectfully submitted,



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